

Abstract

Flood is one of natural disasters worldwide that can cause loss of life and great economic damages. Hence, simulation of hydrological processes such as floods occurred in watersheds is of importance, in order to estimate peak flood discharge and volume caused by rainfalls with different return periods, and identification of the generating reasons of floods. By regarding the current situation in many of Iran's watersheds from perspectives of data scarcity or lack of hydrometric stations and also complexity of the hydrological system of watershed, using hydrological models is of considerable importance. In this study, a case study has been done in the Kameh representative watershed with the area of 50.92 square kilometers located in the north of Torbat Heydarieh. In order to simulate the floods occurred in the study area, WMS (Watershed Modeling System) model as one of the comprehensive models and with capability of combining with GIS and other hydrologic and hydraulic models was used. After preparing topographic maps with 1/25000 scale in ARCGIS9.3 software environment and a digital elevation model (DEM) and its correction in WMS environment by using the TOPAZ model, streams and river network was drawn and then, by determining the outlets location, the boundaries of the watershed and sub-watersheds were specified and the physiographic characteristics of the watershed were calculated. Finally, by using the TR-20, HEC-1, NFF models that are from ones supported by WMS model, rainfall-runoff simulation was performed to estimate peak flow and flood hydrograph. Simulation results were fitted with the observed data and the most efficient model was selected on the basis of the performance evaluation criteria such as Nash-Sutcliffe coefficient and RMSE. The results indicated that in order to simulate the watershed runoff, the HEC-1 model is more suitable than the NFF and the TR-20 models, and if the rainfall - runoff data is available, HEC-1 program shows the more precision for the calibration and simulation of rainfall-runoff. But due to lack of easy access to the parameters of this model, TR-20 model can be more suitably used for many of the similar and ungauged watersheds. In addition, the Curve Number method was determined as the most important factor affecting peak flow and flood hydrograph.

Keywords: flood hydrograph, rainfall-runoff simulation, WMS model, HEC-1 model, Kameh watershed



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